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COOPERATIVE RESEARCH IN WILDLIFE MANAGEMENT--A SUMMARY OF THE PROJECT TO FEBRUARY 15, 1936

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INTRODUCTION

With the signing of an agreement by State agencies in Ohio, the quota set for the first part of the cooperative wildlife research program now under way between the Bureau of Biological Survey and various State agencies is complete. The purpose is to find out how to increase, maintain, and use wildlife resources, and to show, on trial areas, how facts found by research can be given practical application.

COOPERATING AGENCIES

During the past year, funds were obtained by the Biological Survey for initiating a program of wildlife research and management in cooperation with nine States. These funds are from two sources: (1) Appropriated funds of the Survey itself; and (2) cooperative funds furnished to the States by the American Wildlife Institute. Those of the Survey are being used to employ and station in each State a project leader, who will direct the work. Those from the Institute are used to establish graduate fellowships, to provide assistants in the work and to meet other expenses. This combined participation amounts to $6,200 a year for each of the nine States in the program. In addition, and as a requirement, before undertaking a program in any State, the State game department and the land grant college each agree to furnish annually for five years $6,000 in cash, or in an equivalent of materials or services that will take the place of the specific expenditures that otherwise would have to be made from cash funds.

SELECTION OF COOPERATING STATES

In starting the program, all States were made aware of the opportunity. Some were not interested, some found they could not obtain the required funds, and in some the various State agencies could not agree to get together. In spite of this, there were more States desiring the work than could be handled with this year's resources, and it was possible to establish only nine stations. The next selection was therefore made with the objective of operating on the basis of natural ecological units, so that work done at each station would have regional application.

TABLE 1.--States cooperating

State	Location of station	Ecological region	Remarks
Oregon	Oregon Agricultural College, Corvallis, Oreg.	Northern section of Pacific coast region	With problems distinctly different from the southern Pacific coast zone and typical of Oregon, Washington, and northern California.
Utah........	Utah State Agricultural College, Logan, Utah.	Intermountain region	Typical of the problems of Utah, Nevada, southern Idaho, and western Wyoming.
Texas.......	Texas Agricultural and Mechanical College, College Station, Tex.	Eastern section of the Southwest region	The State of Texas, in area and scope of work is almost a region in itself but problems worked out there will serve most of Texas and Louisiana.
Iowa........	Iowa State College, Ames, Iowa.	Northern Mississippi Valley region.	Typical of problems for Iowa, eastern South Dakota, eastern Nebraska, southern Minnesota, Illinois, and northern Missour

TABLE 1.--States cooperating - Continued

State	Location of station	Ecological region	Remarks
Maine........	University of Maine, Orono, Maine.	Northern section of New England region.	Wildlife problems in Maine cannot be compared with those of the States to the south. Species and ecology are distinctly different.
Connecticut..	Connecticut Agricultural College, Storrs, Conn.	Southern section of New England region.	Typical problem with the rest of the New England States.
Virginia.....	Virginia Polytechnic Institute, Blacksburg, Va.	Northern section of the Southeastern region.	While many species are the same as in the more southern coastal States, their ecology is distinctly different. The problems here will serve Virginia and parts of West Virginia, North Carolina, and of South Carolina.
Alabama......	Alabama Polytechnic Institute, Auburn, Ala.	Southeastern region.	Typical of the Gulf States section and with problems very distinct from Virginia and serving the Alabama, Georgia, northern Florida, and eastern Mississippi group.
Ohio.........	Ohio State University, Columbus, Ohio.	Ohio Valley region.	Typical of Ohio, Indiana, and parts of Pennsylvania, West Virginia, and Kentucky.

ADMINISTRATION OF PROGRAM

In administering the work and the funds an advisory committee is set up, usually constituted as follows: The project leader and the Survey's field supervisor represent the Biological Survey and the American Wildlife Institute; the executive head of the game department usually represents the State Game Commission; a member of the land grant college experiment station staff (usually the head of the Biology Section) represents the college.

Project Leaders

Alabama.- H. S. Peters, Alabama Polytechnic Institute, Auburn, Ala.
Connecticut.- Dr. Paul D. Dalke, Connecticut Agricultural College, Storrs, Conn.
Iowa.- Logan J. Bennett, Zoology Department, Iowa State College, Ames, Iowa.
Maine.- C. M. Aldous, University of Maine, Orono, Maine.
Ohio.- Ohio State University, Columbus, Ohio. (Leader not yet appointed.)
Oregon.- Arthur S. Einarsen, Oregon Agricultural College, Corvallis, Oreg.
Texas.- Dr. W. P. Taylor, Texas A & M College, College Station, Tex.
Utah.- Dr. D. I. Rasmussen, Utah State Agricultural College, Logan, Utah.
Virginia.- C. O. Handley, Biology Department, Virginia Polytechnic Institute, Blacksburg, Va.

OBJECTIVES

Paramount objectives of the program are three:

1. To carry on such research and investigation as will furnish foundation knowledge upon which to base practical wildlife management.

2. To establish actual experimental and demonstration areas where methods of handling wildlife and environment and methods of game management and utilization can be tested out, and where landowners, hunters, and all others interested in wildlife production can see examples of such management and utilization. These areas will be conducted under practical land-utilization conditions as they exist in various parts of the country.

3. To carry on educational work: (1) To make available to the public the results of investigations and demonstration; and (2) to promote a greater interest in wildlife production and in practical methods of making a surplus available for utilization.

TYPES OF QUESTIONS NEEDING ANSWER

What are the natural requirements for game and other species?

What elements have disturbed the normal balance and occurrence of wildlife? Are these disturbances permanent? Where detrimental, what can be done to overcome the handicaps?

After some of these things are known, how can the remedies be applied? How can cover and food be produced in sufficient quantity to build up adequate surpluses of game species for annual hunting, trapping, and other purposes without prohibitive cost?

What kind of a plan will give the landowner enough incentive not only to regulate the take but also actually to carry on improvement work that will increase the surplus that can be taken, and then encourage him to permit hunters to come on to his place and take it? What relation can game production have to land use and income from land?

To answer such questions will require extensive research, trial, and demonstration.

STATE PROGRAMS OF WORK

There are four chief aims in selecting the programs for the several States

1. To build the program, including investigational and demonstration work, around such needs and problems as are found to be of the most pressing immediate concern and of the greatest future benefit to the State itself.

2. To give the problems and the methods of attack such scope as will make them applicable to the whole ecological region in which the station is located.

3. To have each station eventually work out a complete life-history study and management practice for some one particular fur, game, or other wildlife species and thereby make a major contribution to the literature and knowledge of wildlife.

4. To bring each line of investigation to the ultimate goal of having worked out not only the information but the practical method for its application in solving the problems of perpetuation and utilization of wildlife.

The outline of the State programs is intended to give only a general idea of what these include. The designation of a "primary" species or problem does not indicate that such species or problem is of greatest importance, but simply that it is the major species for study and management as referred to in paragraph No. 3, above.

Alabama

Plans for graduate assistants and faculty participation now being completed.

A. Investigational work.
  1. Mourning dove.
    Important game species of the Southeast.
    Little known of complete life history or successful methods of management.
    Alabama has a good population of both resident and migratory doves.
    Study will include with life-history work such phases as effects of shooting, proper shooting methods, and effective management methods.
    Survey of nesting doves now under way.

  2. Bobwhite quail.
    Not a complete life-history study.

Purpose to work out adaptations of known information to Alabama conditions.

Tests of food and cover plants on Alabama soil types-- in cooperation with Experiment Station farms.

Study of fire ant damage to hatching quail. Fire ants may be the most important predator on quail in many sections.

Trial demonstration area (see below).

3. Turkey.

State has had open season on gobblers during breeding season for some years. Evidence exists of wider polygamy than ordinarily supposed. Excellent opportunity to study these phases to supplement Virginia life-history study. They have direct bearing on administration and management practices.

Turkey management practice to be studied on a trial demonstration area.

4. Waterfowl food plants.

To study food situation and needs for improvements and successful methods for improvement on the State-owned refuge area of 5,000 acres.

In cooperation with Botany Department.

Survey work and vegetation studies under way.

5. White-tailed deer.

Opportunity to study phases of deer problem on large private area as follows:

a. Evidence that area has been carrying for a number of years a much heavier population than normal. Why, and how has this been possible?

b. Opportunity to get good weight, condition, and growth data and to correlate them with habitats, population density, and other factors.

c. Area incorporates a community hunt and affords opportunity to study possibility of utilization of these large private holdings by a larger hunting population.

Need to work out carrying capacity and control of population density for deer ranges because of evidence of food shortage from overbrowsing.

Study of weights and hunting population gotten under way during past winter.

6. Fox studies.

To gather enough information to round out knowledge of the food habits of foxes throughout the year. This to enable intelligent management of foxes and determination of what regulations should control their utilization, and to determine the importance of foxes in keeping under control other serious predators of game.

B. Trial management and demonstration areas.

1. Use of private preserve area described above under "white-tail deer" to show practical management methods and ways of taking the surplus. Will be important for turkey as well as deer. Studies now under way.

B. Trial management and demonstration areas--Continued

2. A quail management area to try out field management practice and to work out coordination with other land use. In cooperation with private landowners. Area being selected.

C. Educational work.

Detailed plans for educational work not completed.

Connecticut

Two graduate assistants have been chosen and will report for duty soon. One specialist is at work on statistics. One WPA project has been organized for statistical study.

A. Investigational work.

1. Eastern cottontail.
   The primary species for the Connecticut program. An extensive life-history and management study, pointing especially toward development of management methods that can be coordinated with agricultural practice.
   The Lebanon Township regulated shooting area now being organized for use in making these studies (see below).

2. Correlation of existence of game populations with cover types.
   To determine what the factors in various types or combinations of types are that control the presence or absence of game, fur, and other wildlife species.
   To determine how far a type study can be used as an indicator of existing wildlife populations.
   To determine whether such information can be developed into simpler methods of estimating game populations for use by landowners, game officials, and others, in regulating the take and in carrying on management work.
   Preliminary type mapping and vegetation studies now under way.

3. Planting tests of seeds and plants to determine best food and cover plants for the New England section and the most practical methods of establishment, handling, and maintenance. Preparations under way for seeds and plant materials for spring planting.

4. Statistical study of game reports.
   State has accumulated a large number of hunters' reports. Excellent opportunity to study: (1) The value of reports and uses to which they can be put in working out administrative problems of game department; (2) value in pointing the way to intelligent regulations; and (3) simpler methods of making use of these large accumulations of data by selected sampling.
   A specialist is now at work on this study and a WPA project was organized to assist in the study.

B. Experimental demonstration and management areas.

1. Connecticut Agricultural College Farm.
   To be used for intensive investigational work on quail and rabbits.

2. Lebanon Township area, approximately 5,000 acres.
   Being organized now as a regulated shooting area under control of State Board of Fisheries and Game.
   Principally for rabbits and quail, probably some grouse.
   Chief purpose to study and develop practical management methods for increasing wildlife populations in cooperation with farmers and to work out more satisfactory hunter-farmer relationships.
   Cover type map completed.
   Sixteen rabbits liberated in January.

3. Grouse area.
   Final selection of area not yet made.
   To serve as a demonstration of known management practices for ruffed grouse.

C. Educational work.

Instruction during annual Farm and Home Week.
Programs for 4-H Club work.
Training work for game officials.
Other plans not completed.

Iowa

In considering the Iowa program it should be borne in mind that a cooperative arrangement for research and demonstration work very similar to the present one has been in effect in the State for three years. The results attained should offer encouragement to those States just starting such programs.

One full-time wildlife extension specialist at work on educational program. Two graduate students at work on research and demonstration areas. One full-time wildlife research man employed by Experiment Station in addition to project leader. Generous amount of regular college staff participation. Total amount of participation by Iowa State College will be approximately $12,000 to $15,000.

A. Investigational work.

1. Ecology of the muskrat.
   The primary species contribution for Iowa. A life history and ecological study by Dr. Paul Errington. The muskrat is probably the most important of all our fur bearers, but certain phases of life history are practically unknown.
   Considerable data already worked out on this problem and these point way to importance of attacking it in two chief environmental types: (1) Iowa marshes; and (2) small streams.
   Work started in summer of 1935 and now under way.

2. Western cottontail rabbit.
   To continue work already under way by member of college faculty. To develop more accurate censusing technic; to evaluate cover; to learn breeding potential and study decimating factors such as disease, parasites, etc.; to study methods of transplanting rabbits.
   Studies have been continuing throughout the winter.

3. Analysis of environmental carrying capacity for wintering bobwhite quail.
   Continuation of work of Dr. Paul Errington to determine: (1) What factors govern habitability of a territory for given number of birds, and (2) whether certain habitats have strategic importance in affecting winter survival of concrete numbers of birds.
   Of immediate importance in management work.
   Studies under way.

4. Duck studies.
   Continuation of work under way by project leader, Logan J. Bennett.
   Objectives: (a) To determine what constitutes adequate nesting cover for certain of the ducks; (b) to study nesting concentration; (c) to study relation between nesting ducks and nesting pheasants; (d) to find out if pheasant production on restored waterfowl areas might be made to pay cost of waterfowl nesting program; (e) to study increase of nesting in restored areas; (f) to study food habits and requirements of young ducks; and (g) to work out a sound waterfowl program for Iowa.
   Studies have been in progress for three years and are continuing. Intensive work will be taken up again in the spring. Several papers on results to date have been presented.

5. Coot studies.
   Purpose: To work out enough life history and ecology information to form a practical basis for management. Species is still plentiful, but game value in this section just beginning to be appreciated, and intelligent management should begin before depletion.
   Studies will include: Relation of coot nesting to nesting of ducks, grebes, terns, and other aquatic birds; related aquatic plant growth and population studies; juvenile mortality studies; correlations with muskrats and densities of aquatic plants.
   Work will start in spring of 1936.

6. Parasites and diseases of wildlife, emphasizing pheasants, quail, wild ducks, and rabbits.
   Work will be done by present members of veterinary and zoology staffs.

B. Trial management and demonstration areas.

1. Quail areas.
   Two areas have been established in Decatur County in cooperation with farmers to find out; (1) How quail can be produced on private

lands on a practical basis; (2) how to regulate the take; (3) how to compensate the landowner for his work in raising quail; and (4) how to fit quail management into the agriculture of the region.

First area, approximately 4,200 acres, with 22 farms. A paid shooting area, with farmer agreements to carry out certain specified management practices. A graduate student resident on the area to supervise the work and keep records of all revenues from quail, fur bearers, and other sources.

Second area, approximately 2,100 acres, with 11 farms. Rental of 10 cents per acre per year paid farmers from cooperative funds for public shooting rights, with requirements that farmers carry out certain management practices. The resident graduate student on first area is supervising this area also and keeping records of returns, and other data. Hope is to find out whether such a plan will prove economically sound for a game commission and how much improvement work a farmer can be expected to put in for the rental paid.

In both areas ecological studies and studies in relations of quail to other wildlife are being conducted.

2. Pheasant areas.

Two areas proposed, one having approximately 6,500 acres, with 23 farms, now organized. Farmers have agreed to charge $1 a day for shooting rights and to carry out specified management practices. Area organized in territory where plan has endorsement of progressive sportsmens' group. A graduate student resident on the area who is also carrying on winter mortality studies, studies on relationship to other species, and studies on reasons for limitations in increase of Hungarian partridge.

C. Educational work.

Wildlife Extension Project has one full-time extension specialist in charge and is emphasizing junior activities. Work has been under way for three years, during which time 7 mimeographed booklets on wildlife recognition and care have been published, with over 100,000 circulation. Fifty radio addresses have been given and talks and field demonstrations given to 7,000 juniors.

1936 program calls for publication of five wildlife bulletins: Winter Birds, Game Birds and Their Management, Spring Birds, Waterfowl, and Iowa Fishes. The first of these has been printed. The Game Bird bulletin is nearly ready for the press.

In addition to publications the other lines of effort will be continued

Mats have been prepared of the bird pictures for use of newspapers over the State.

A four-day training school for the conservation officers of the State Conservation Commission has been held.

Maine

Maine is the last State, except Ohio, to get program under way. The project leader has been on the job only a short time. Final program has not been decided upon. Important problems for which Maine affords excellent opportunity for study and around which final program is likely to be built are:

1. Woodcock as a primary life-history study species.

2. Problem of forest-game relationships and methods for practical coordinated management. Good trial and demonstration area available.

3. Moose, especially with reference to moose diseases.

4. Negotiations have practically been completed for an assistant to the project leader. Graduate student assistance has not yet been employed.

5. University of Maine has completed plans for a four-year wildlife undergraduate course. Because of the high percentage of forest lands in the State and the close association of all wildlife work with forestry, the work is being coordinated with the Forestry School.

Ohio

The Ohio agreements have been so recently completed that while organization of the program is now under way, no details can be reported on at this time.

Oregon

One graduate student at work on research projects. Six undergraduate students employed for special problems. Generous participation by college teaching and extension staffs.

A. Investigational work.

1. Small game problems in the Willamette Valley.
   Mountain quail now present in only fraction of original numbers. Blue grouse are rare. Chinese pheasants are on downhill grade. Fur bearer importance and potential possibilities not known.
   Purposes of problem: (1) To determine whether environment, disease, predator relationships, and other biotic factors are responsible for decrease of wildlife; or whether responsibility lies with lack of control, poor regulation and management, or other non-biotic factors; (2) what can be done to remedy the situation; and (3) particular attention will probably be given to blue grouse.
   Plans call for comprehensive program of field observations, censuses, banding work and environmental type studies, with the East Farm and Granger Farm of Oregon State College as intensive study areas.

2. Study of Oregon deer problem.
   Three species in Oregon. Shooting limited to bucks. Evidence points to shortage of bucks in sex ratio and resultant decrease in population. Deer abundance varies greatly in various districts--Why? Deer and small game licenses furnish largest part of game administration funds. Same management policies are required.
   Work will be in nature of State-wide study, with special emphasis on consequences of the buck law.

3. Life history and management of Oregon antelope.
   A long-time, primary-species, life-history study for the State, pointing toward intelligent regulation and management recommendations and giving special attention to the relation to agriculture and grazing.

4. Diseases and parasites of wildlife.
   A supporting study for the other lines of investigation.

B. Trial management and demonstration areas.

One typical demonstration unit to be established to study:

1. Wildlife production possibilities in conjunction with regular farm procedure.

2. Advantages to private landowners in wildlife production.
   Special attention to intelligent handling of present farm and livestock predator problem.

C. Educational work.

Program of educational work must be built up gradually. Progress reports to be important in this.
Plans have been worked out with State Extension Service.
Series of contacts under way with county agricultural agents. Conferences held in districts in Willamette Valley. Clackamas County agent very active and effort to be made at county economic conference to put entire county under game management.

Oregon State College has a four-year undergraduate course in wildlife.
A "Ding Darling" club has been organized with students in this course as nucleus, but with intent to bring together students, faculty members, research workers, and others from other courses and branches of work to discuss interrelationship of wildlife with other subjects and to create cooperative interest in wildlife in the allied fields. Suggested by Oregon that this become national.

Research unit has worked out a plan for use of undergraduates in wildlife course during summer periods and at other times to gather data and carry on some of the studies. Involves careful plan of examination and selection of workers.

Texas

One of the newer States to start work, and program not finally determined. The project leader and one assistant now on the job. Following program under tentative consideration.

A. Investigational work.

1. Western bobwhite quail.
   Persistent demand for introduction of Mexican bobwhite. Indications that where introduced demand for female native bobwhites increases.
   - a. Laboratory tests of results of crossing native and Mexican bobwhites.
   - b. Field check tests on crossing native and Mexican bobwhites.
   - c. Percentage of winter losses among bobwhites.

2. Deer and turkey management, with such life-history and ecological studies as are needed to produce sound management practice recommendations.

3. Systematic phenological study of plants of Walker County to support the county-management program.

4. A number of other phases of work are under consideration, among them the possibility of major life-history study for peccary., antelope, or white-winged dove.

B. Trial management and demonstration areas.

1. Wildlife production in Walker County. Purpose: To determine possibilities of surveying, censusing, planning, organizing, and carrying out a game and fur management program with a county as a unit. Emphasis to be placed on benefits to landowners through utilization of wildlife crops.

2. Establishment of demonstrations in wildlife management practice on Texas A & M College grounds.

C. Educational work.

Program being developed.

Utah

Parts of Utah program are well under way, but complete plan of work and final program not yet determined. One special assistant for range studies, one graduate student, and one undergraduate on special problems now at work.

A. Investigational work.

1. Life history and management study of mule deer. A primary species study. Particular emphasis on relation of livestock grazing to the species and development of a practical coordinated plan of management. An assistant especially qualified to study range phase is now at work on range census and winter studies.

2. Life history and management study of sage grouse. Plan of work being drawn up.

3. Survey of sharp-tailed grouse. Most of work finished as master's thesis by a graduate student. Distinct correlation to remnants of primitive grassland shown. Report written up and submitted for thesis and degree.

4. Beaver survey. A problem exists in the matter of overabundance in certain localities, and lack in others. Survey to find these localities and bring about a more equable distribution and to determine allowable take by trapping.

5. Fish studies. To complete work started by the project leader at previous date. Concerns chiefly indications of rate of growth and age by scales.

B. Trial demonstration and management areas.

Not finally selected.

C. Educational work.

Program not completed.
4-H pheasant rearing project conducted during past year. The 4-H Club members hatched 48 percent of the eggs furnished them and raised 51.8 percent of the birds hatched.

Virginia

The first State to get a project leader appointed and a program under way. Three graduate students and one part-time assistant are now engaged on the program. Generous faculty participation, including one botanist half-time.

A. Investigational work.

1. Wild turkey. Primary life-history and management study. Points for special emphasis will be: Relation to quail and grouse; disease of wild turkey; method of increasing production by mating tame hens with wild gobblers; and management and "harvesting" practice. Work is under way.

A. Investigational work--Continued

2. Quail.
   Studies chiefly to adapt known information to Virginia conditions and to work out food and cover planting and practical management practice. Work is under way.

3. Grouse and deer.
   Same as for quail.

4. Birds of Virginia.
   Completion of study under way for several years to gather information on distribution, abundance, and nesting and other habits of Virginia birds.
   Field work well along. Publication of annotated list this year. Later publication on Birds of Virginia.

5. Fox studies.
   Completion of studies already under way by project leader in cooperation with Bureau of Biological Survey. Particular purpose to determine relation to predation on game birds and relation to control of other natural enemies of birds. Publication may be made on this during first year.

6. Elk in Virginia.
   Large expenditures made for introductions, and demands for more; but evidence is that plantings have not been successful. Purpose: To determine why, and whether further money should be spent on elk.
   One part-time assistant has been arranged for to make these studies this year.

7. Plants of Virginia.
   Member of Botany Department assigned half time to make survey and collections of plants of Virginia and to study ecology with special reference to occurrence of wildlife food and cover plants, and to form background for game management practice. Work now under way.

8. Crows.
   A short-time minor project to finish work on a method of crow control.

B. Trial management and demonstration areas.

1. Blacksburg Area.
   College grounds to be nucleus of area and to serve as laboratory for intensive quail management studies. Surrounding area of private land to be organized as management area for regulated take. Special study of use of preserve as reservoir of supply for surrounding area.

2. North River Area.
   In George Washington National Forest.
   For deer, turkey, and some quail.
   Part to be a refuge; remainder to be public shooting area under regulations.

   Purposes:
   (a) To study value of refuge reservoir on public area.
   (b) To demonstrate and try out management practices.
   (c) To determine whether returns from hunting privileges on public land can be made to carry costs of game management.

3. Mountain Lake Area.
   In George Washington National Forest.
   Purpose chiefly to have area nearer college for intensive studies on method of producing turkeys with use of tame hens and wild gobblers and for intensive management studies for grouse and deer.

4. Buckingham County Area.
   Cooperative with Resettlement Service.
   To be managed as game-producing unit, with charges for hunting privileges to cover cost of administration. Probably a crop-share plan with selected farmers, to maintain quail environment and help carry operating costs.

C. Educational work.

Educational work for present to be concentrated on following:

1. Wildlife work at county agents' conferences.
2. Wildlife work at district game wardens' conferences.
3. Series of lessons during annual Farm and Home Week.
4. Three-hour credit course in biology curriculum, given by assistant.